REMARKS

Applicant would like to thank the Examiner for the thorough examination of the present application. The arguments supporting patentability of the claims are presented in detail below.

I. The Claims Are Patentable

The Examiner rejected independent Claims 11, 25, 34 and 40 over the Stout et al. patent. The present invention, as recited in independent Claim 11, for example, is directed to a pseudo-random number generator comprising a first generator for generating a sawtooth waveform signal having a first frequency, a second generator for generating a pulse signal having a second frequency, and a sampling circuit is connected to the first and second generators for sampling the sawtooth waveform signal using the pulse signal for generating a sample signal of the sawtooth waveform at the second frequency. A coding circuit is connected to the sampling circuit for generating pseudo-random numbers based on the sample signal.

Independent Claim 25 is also directed to a pseudo-random number generator, and is similar to independent Claim 11. However, independent Claim 25 more particularly recites that the coding circuit codes an amplitude of the sample signal by generating a signal representative of a binary value 1 or 0 based upon whether the amplitude of the sample signal is greater than or less than a reference value. Pseudo-random numbers are generated by the coding circuit based on the coded amplitude.

Independent Claim 34 is also directed to a pseudo-

random number generator, and is similar to independent Claim 11. However, independent Claim 34 more particularly recites that the first generator comprises a capacitor, a switching circuit and a switching control circuit. Independent Claim 40 is directed to a method for generating pseudo-random numbers, and is similar to independent Claim 11.

Referring now to the Stout et al. patent, and to FIG. 2 in particular, a first generator **112, 114** generates a sawtooth waveform signal having a first frequency, and a second generator **116, 118** generates a pulse signal having a second frequency. The Examiner has taken the position that a sampling circuit **120, 122** samples the sawtooth waveform signal using the pulse signal for generating a sample signal of the sawtooth waveform at the second frequency, as in the claimed invention.

The Applicant respectfully disagrees. In the background section of the Applicant's specification, the Applicant has already noted the deficiencies of the pseudo-random number generator disclosed in Stout et al. The characterized sampling circuit **120, 122** in Stout et al. does not sample the sawtooth waveform signal from the first generator **112, 114** using the pulse signal from the second generator **116, 118**.

Instead, the characterized sampling circuit **120, 122** receives the sawtooth waveform signal from the first generator **112, 114** and provides it as input to the second generator **116, 118**. The sawtooth waveform signal is used for controlling the second frequency of the second generator **116, 118**. Reference is directed to column 2, lines 26-32 of Stout et al., which provides:

> "The second current source **118** is coupled at a first control input directly to the output of the first oscillator **112** to be modulated by the saw-tooth waveform output therefrom. As will be discussed further below, the output of the first oscillator **112** is also coupled to a second input of the second current source **118** via a transmission gate **120**, which controls an adjust signal **Adj1**." (Emphasis added.)

The sampling circuit **120, 122** does not sample the sawtooth waveform signal from the first generator **112, 114** using the pulse signal from the second generator **116, 118**. Instead, the output of the sampling circuit **120, 122** is used as an input to the second generator **116, 118** for increasing the unpredictability of its own output signal.

The Examiner's response is that the term "sampling" means taking samples from a given input signal by many means, and the claim language does not define how to sample the sawtooth waveform. In the Stout et al. patent, the Examiner argues that the second generator **116, 118** is generating a pulse signal having a second frequency and modulates the sawtooth waveform - which is the same as sampling the sawtooth waveform for generating pseudo-random numbers.

In addition, in response to the Applicant's argument that the sawtooth waveform is used for controlling the second frequency of the second generator **116** and **118**, the Examiner's response is that the two adjust bits **Adj1** and **Adj2** are used to adjust the randomness of the random number by dividing with a predetermined ratio.

In response to the Examiner's arguments, the

disclosed random number generator as illustrated in FIG. 2 of the Stout et al. patent comprises a square wave oscillator **116** that is frequency-modulated by a sawtooth oscillator **112** acting on the current source **118** that supplies the square wave oscillator. The output pulse train produced by the square wave oscillator **116** is representative of a random number. Randomness of the output is improved by briefly closing the switch **120** under software control to sample the modulating waveform and applying the sampled value, which is held on capacitor **122**, to the current source **118** so that the frequency of the square wave oscillator **116** is adjusted by a variable amount.

The Applicant respectfully submits that it is erroneous to conclude that the sawtooth waveform from the sawtooth oscillator **112** is sampled by using the pulse signal from the square wave oscillator **116** to supply samples of the sawtooth waveform at the frequency of the pulsed signal from the second oscillator - as in the claimed invention. The Examiner's position does not correspond to the technical meaning as disclosed in Stout et al. - where Stout et al. clearly describes that the square wave oscillator **116** is frequency modulated by the sawtooth oscillator **112**.

As noted above, the sampling circuit in Stout et al. comprises a switch **120** and a capacitor **122**, and the samples of the sawtooth signal in Stout et al. are obtained by briefly closing the switch **120** under software control. The sampled value, which is held on the capacitor **122**, is applied to the current source **118** so that the frequency of the square wave oscillator **116** is adjusted by a variable amount. The

Applicant respectfully submits that Stout et al. fails to teach or suggest that the samples of the sawtooth waveform from the sawtooth oscillator **112** are at the frequency of the pulse signal from the square wave oscillator **116**.

Moreover, independent Claim 11 recites that a coding circuit is connected to the sampling circuit for generating pseudo-random numbers based on the sample signal. The random number generator in Stout et al. does not describe such an architecture. In fact, the random number provided by the output train as produced by the square wave oscillator **116** is controlled by the sawtooth waveform from the sawtooth oscillator **112** - and not by a coding circuit.

The variable divider **124**, which is added to the output of the square wave oscillator **116**, and which is considered by the Examiner to be a coding circuit, is not a coding circuit. Reference is directed column 2, lines 49-55 in Stout et al., which provides:

> "The adjustment bit **Adj2** which controls the divider **124** determines whether the output pulse train from the second oscillator **116** is divided by a predetermined ratio before being gated onto the data bus **128**. It will be appreciated that such division of the output pulse train from the second oscillator **116** further 'randomizes' the resultant number." (Emphasis added.)

The divider **124** in Stout et al. simply adjusts the randomness of the random numbers provided by the square wave oscillator **116**, and is not connected to the sampling circuit as in the claimed invention. In other words, independent

Claim 11 recites that the coding circuit is connected to the sampling circuit for generating the random number based on the sample signal generated by the sampling circuit. In Stout et al., the random number is provided by the second generator **116**, and the divider circuit **124** receiving the adjust bit **Adj2** "further" randomizes the random number, as discussed above. Consequently, there is a clear distinction between Stout et al. and the claimed invention.

Accordingly, it is submitted that independent Claim 11 is patentable over Stout et al. Independent Claims 25, 34 and 40 are similar to independent Claim 11. In view of the patentability of the independent claims as discussed above, it is submitted that their dependent claims, which recite yet further distinguishing features, are also patentable over the prior art. Thus, these dependent claims require no further discussion herein.

CONCLUSION

In view of the arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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In re Patent Application of:
MARINET
Serial No. **09/805,265**
Filing Date: **March 13, 2001**
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